

SYSTEM ARCHITECTURE BLOCK DIAGRAM

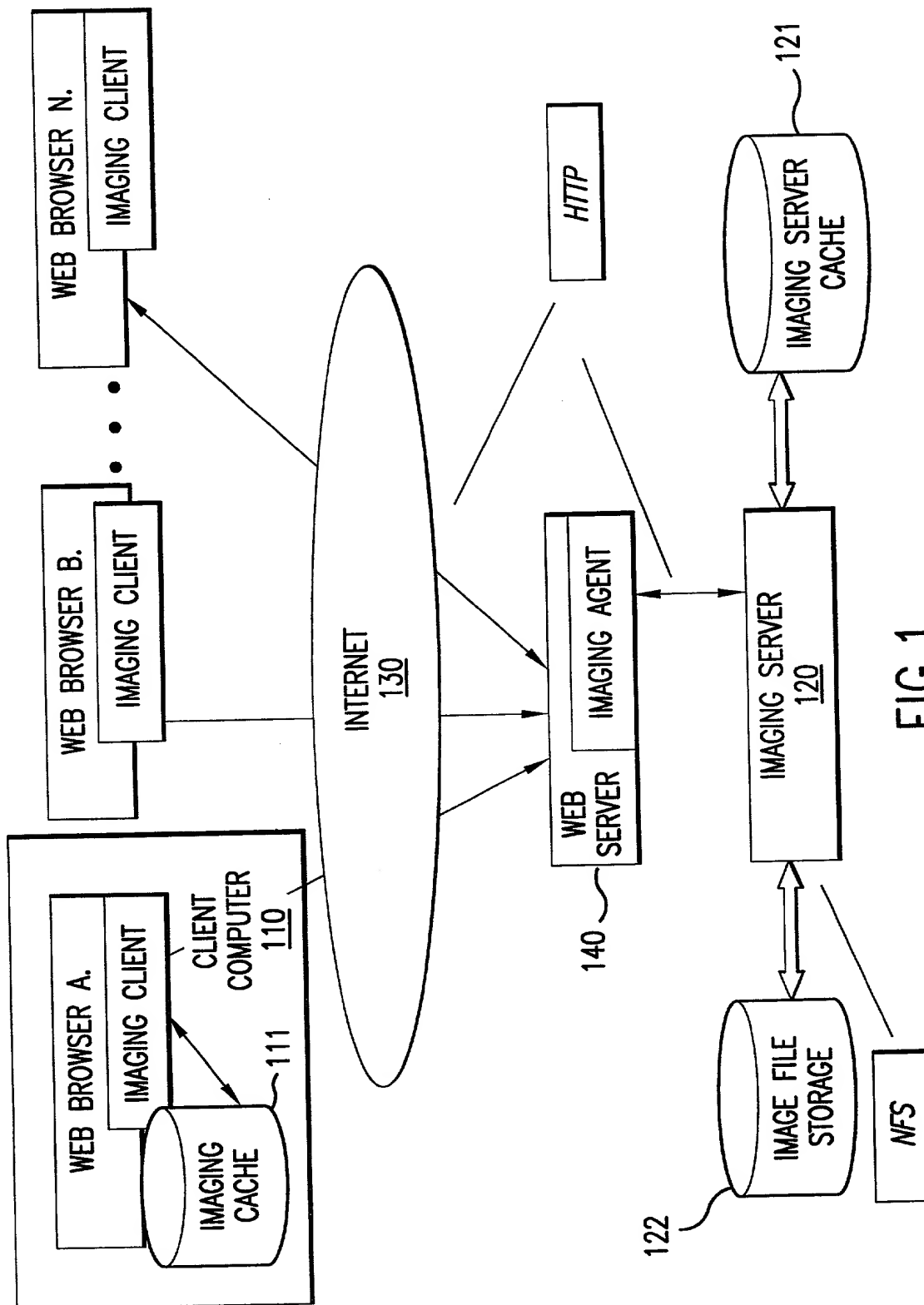


FIG. 1

2/26

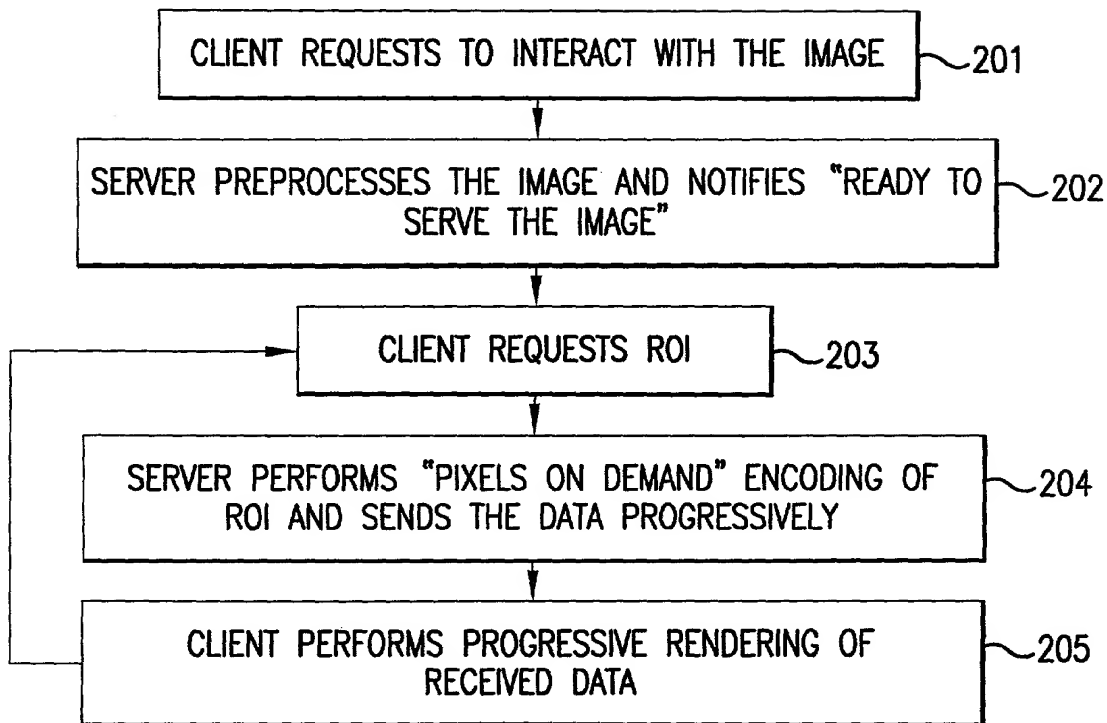


FIG.2

09/837,862 03/2001

3/26

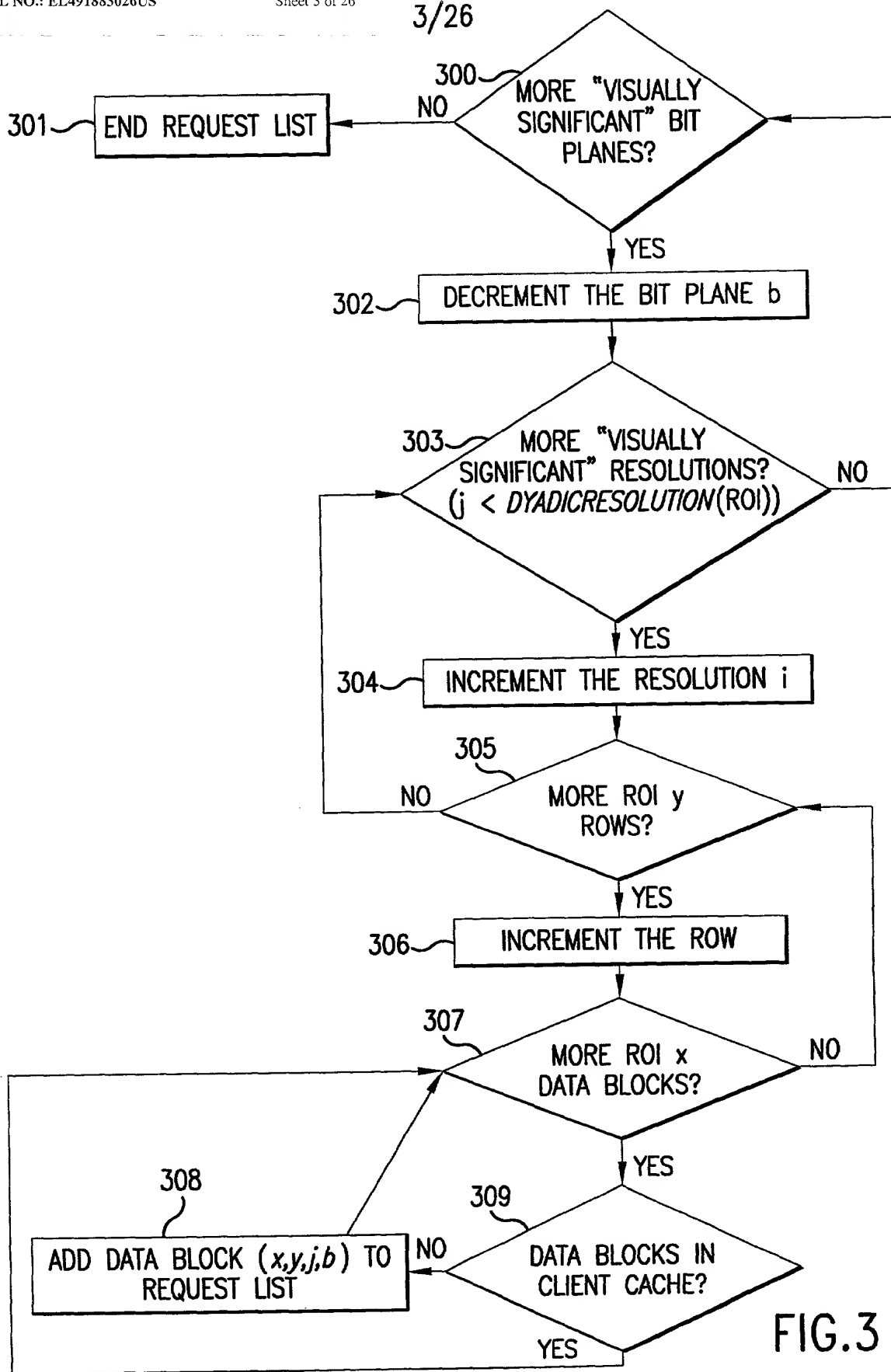


FIG.3

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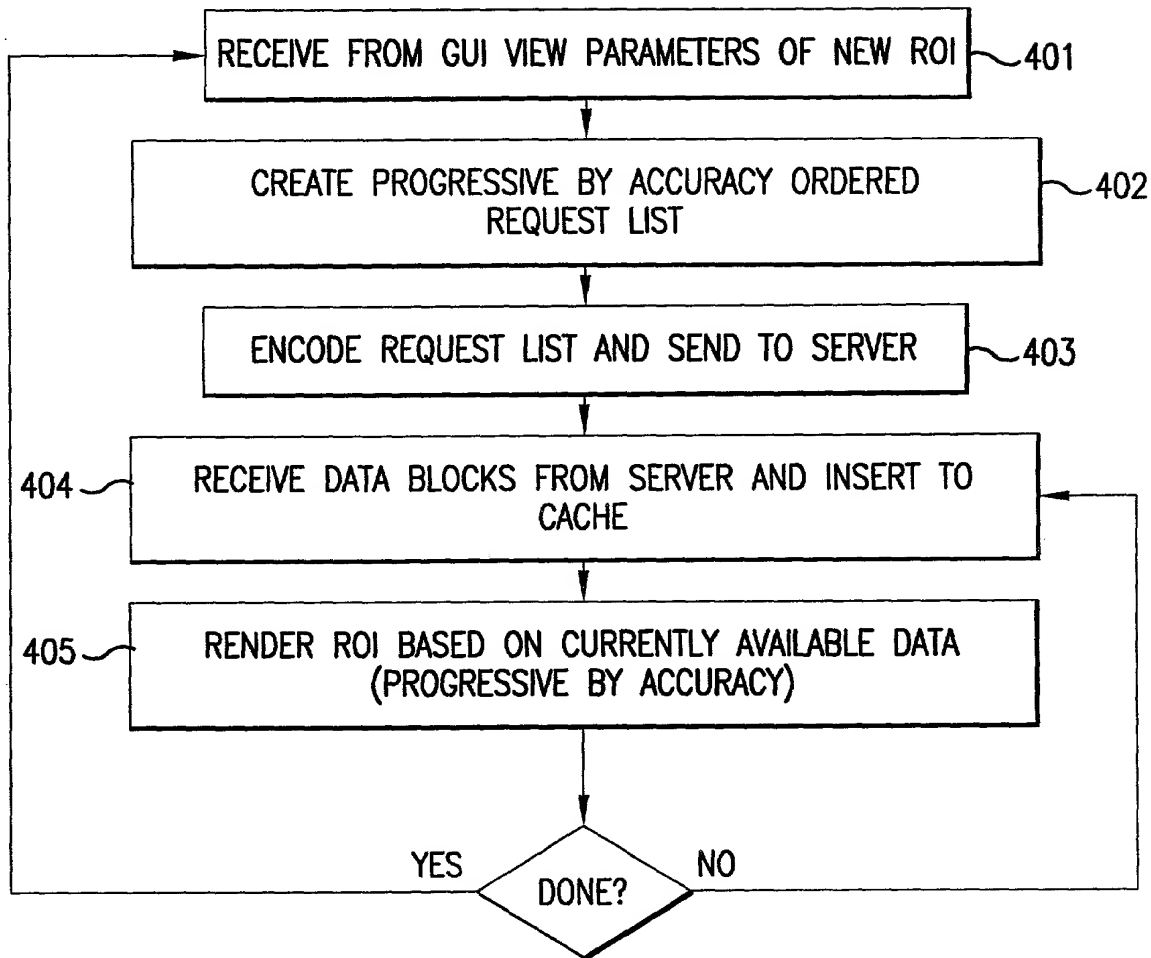


FIG.4

5/26

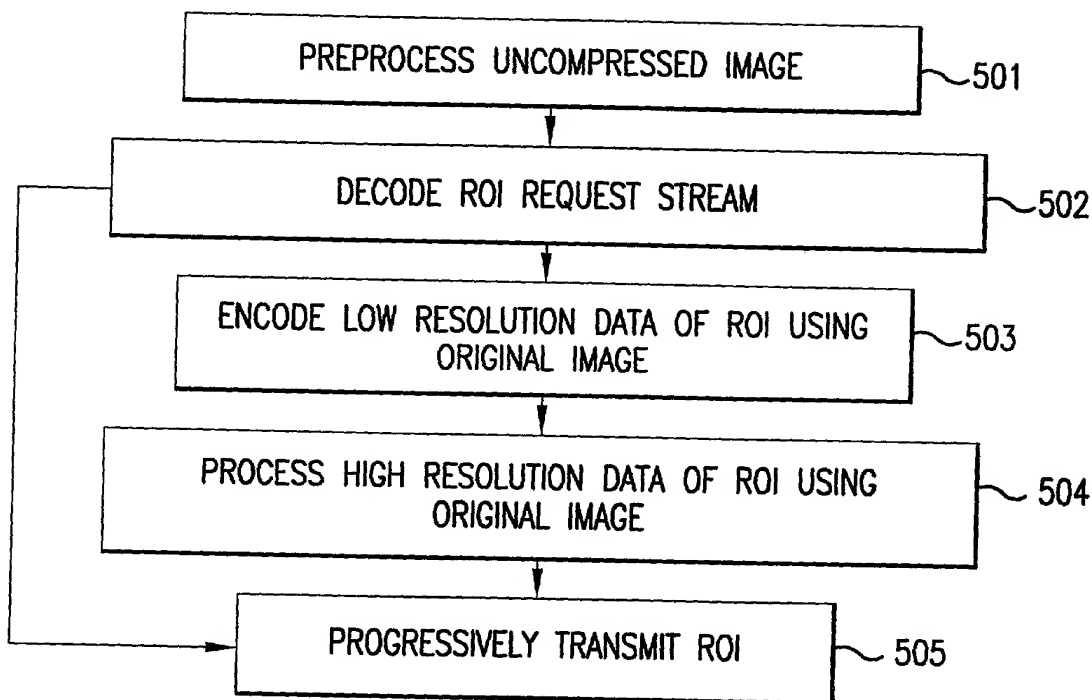


FIG.5

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6/26

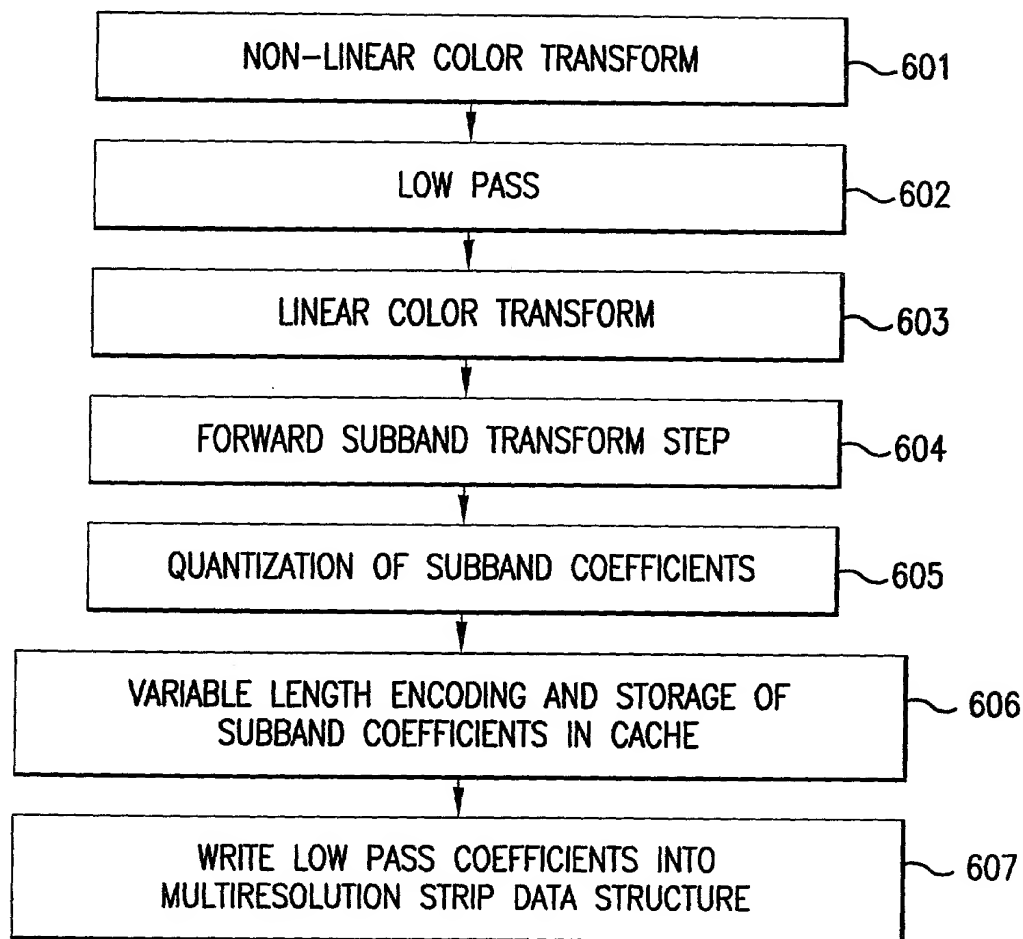


FIG.6

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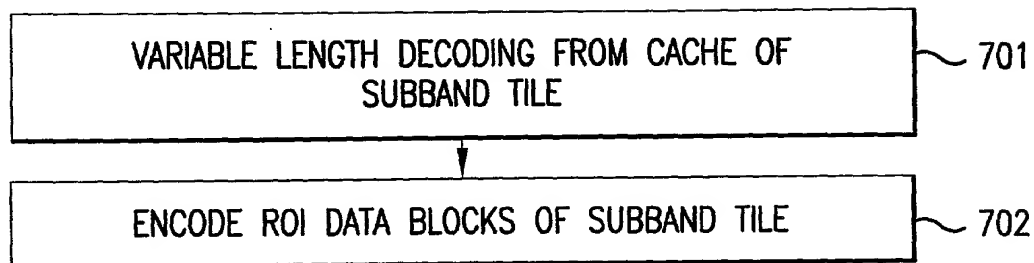


FIG.7

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8/26

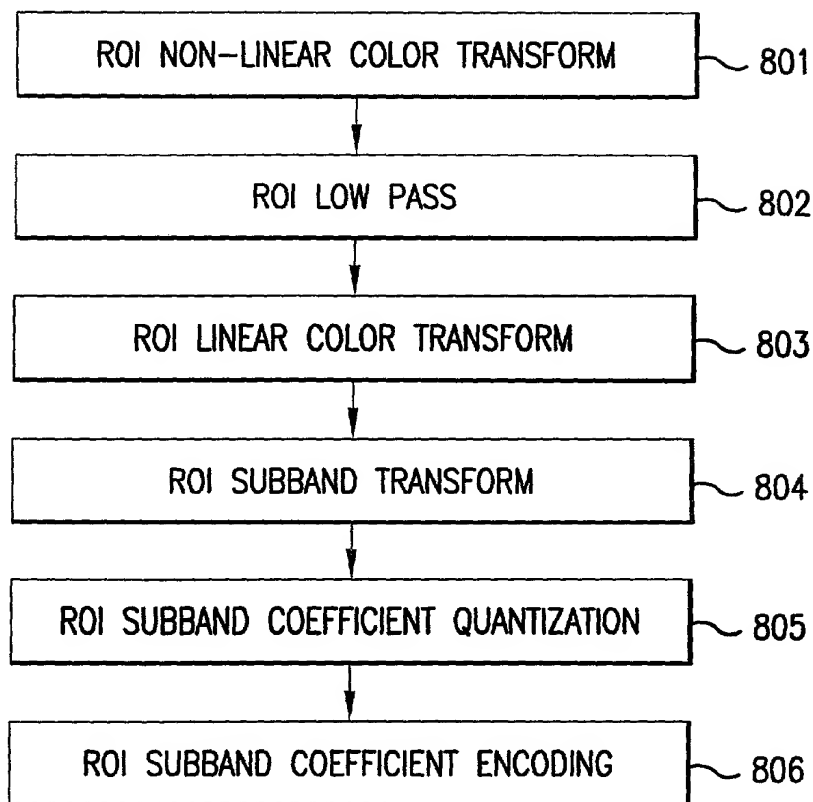


FIG.8

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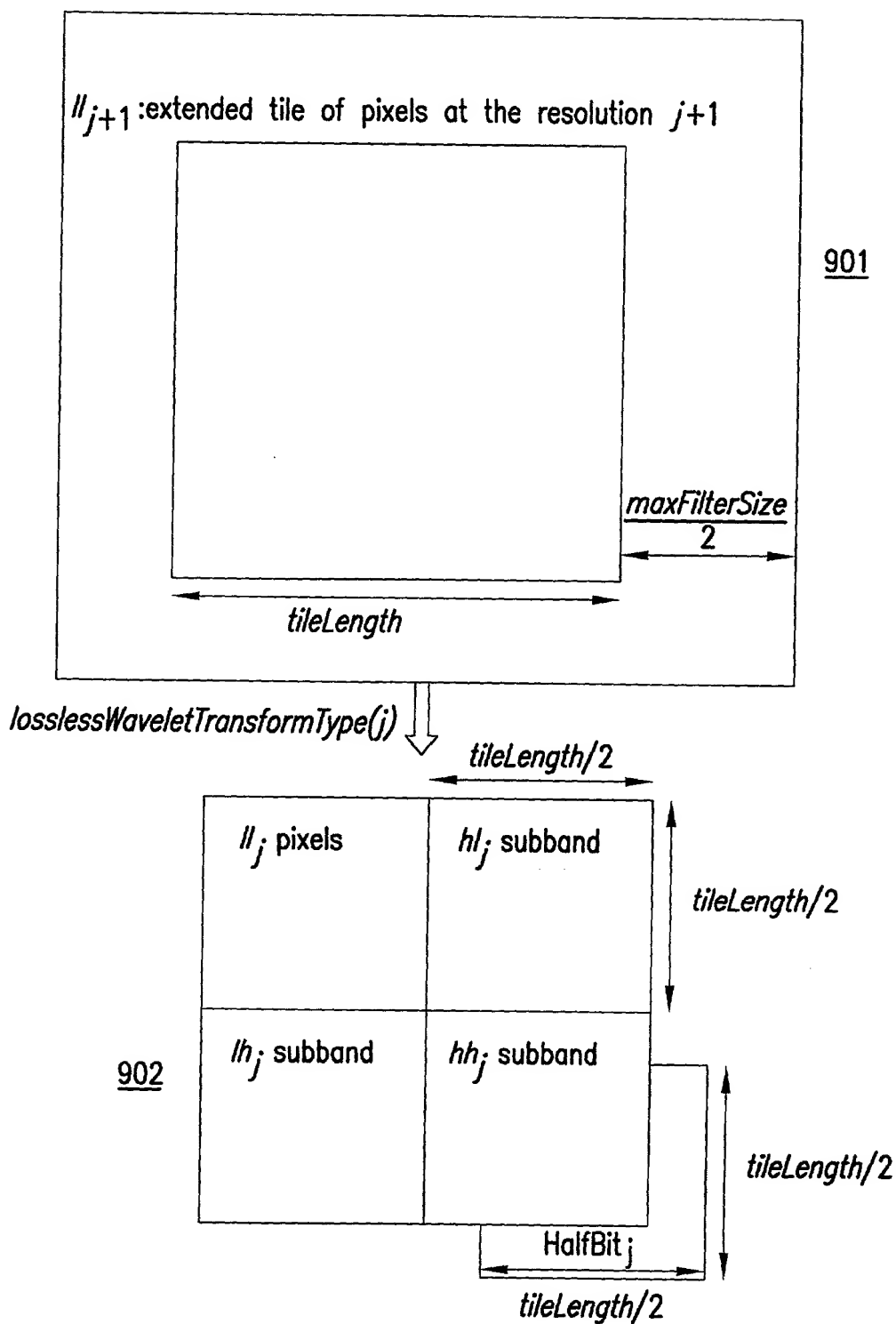


FIG.9

10/26

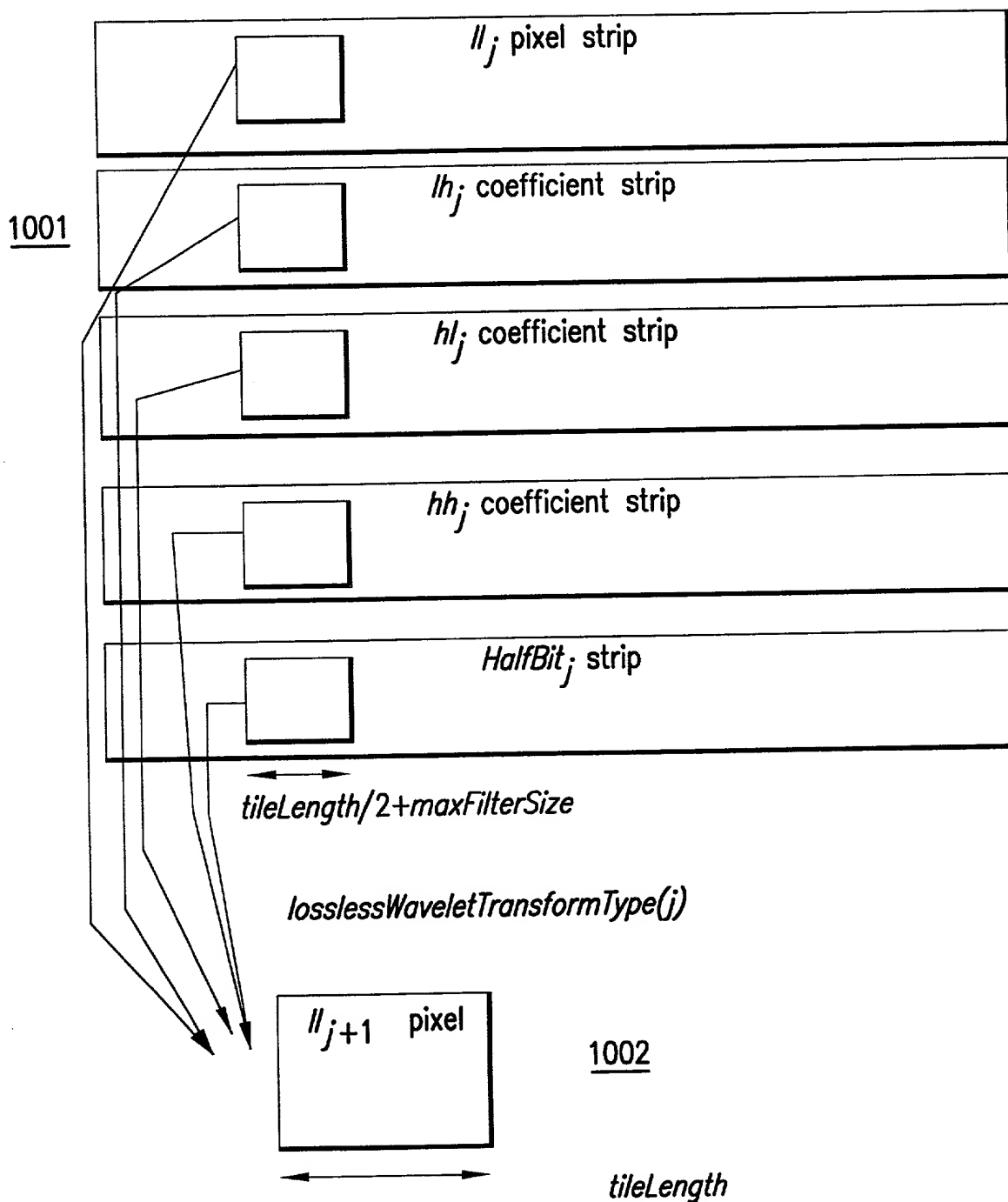


FIG.10

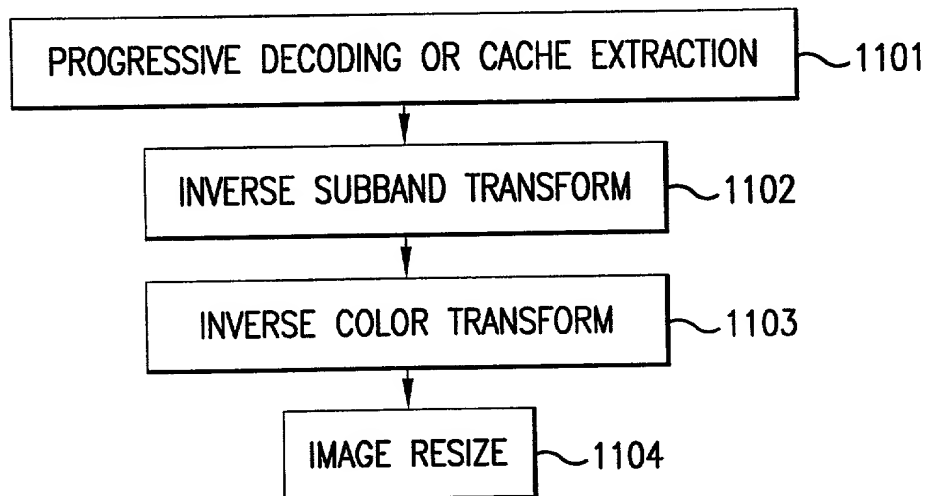


FIG. 11

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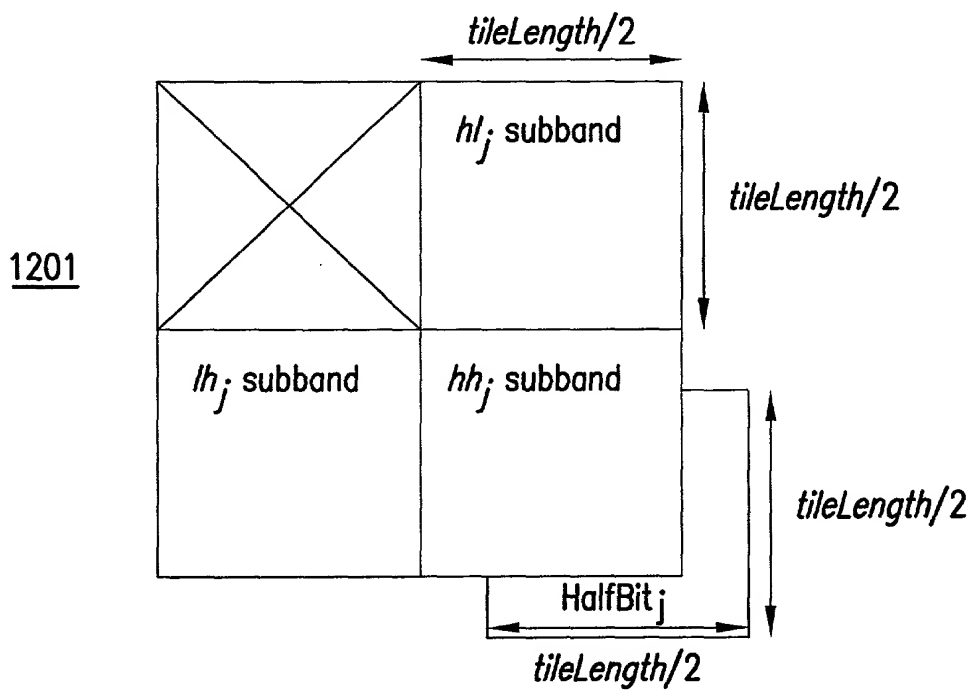


FIG.12

09/837,862-0330

13/26

RGB <-> YUV REVERSIBLE CONVERSION

FORWARD:

$$Y_r = \left\lfloor \frac{R + 2G + B + 2}{4} \right\rfloor$$

$$U_r = R - G$$

$$V_r = B - G$$

INVERSE:

$$G = Y_r - \left\lfloor \frac{U_r + V_r + 2}{4} \right\rfloor$$

$$R = U_r + G$$

$$B = V_r + G$$

1301

FIG.13

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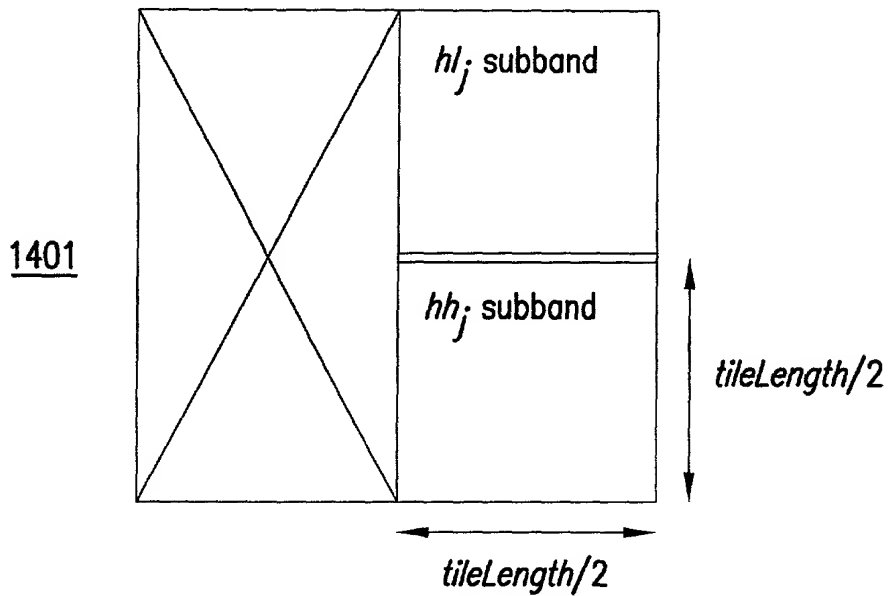


FIG.14

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```

bitModel.startModel () ;
zeroCoefModel.startModel () ;
coefSignModel.startModel () ;

while (encoder.moreCoef ()) {
    if (encoder.isCoefReported ()) {

arithmetic_encode_symbol (bitModel,encoder.reportedCoefPrec
isionBit ()) ;
    }
    else {
        if (encoder.isCoefExactZero ()) ;
        arithmetic_encode_symbol (zeroCoefModel,true) ;
        else {
            arithmetic_encode_symbol (zeroCoefModel,false) ;
            arithmetic_encode_symbol (coefSignModel,encoder.getCoefSign ()) ;
        }
    }
}

```

FIG.15a

```

bitModel.startModel () ;

for (int i = 0 ; i < hBlockSize ; i++) {
    for (int j = 0 ; j < hBlockSize ; j++) {
        arithmetic_encode_symbol (bitModel,
coefHalfBit [i] [j]) ;
    }
}

```

FIG.15b

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16/26

```

                                bitModel      .startModel() ;
zeroCoefModel.startModel() ;
coefSignModel.startModel() ;

decoder.initializeLSBPlaneCoefScan () ;

while (decoder.moreCoef ()) {
    if (decoder.isCoefReported ()) {
        if (decoder.isLHCoef ()) {
            decoder. updateLSB (0) ;
        }
        else {
            decoder.updateLSB (arithmetic_decoder_symbol (bitModel)) ;
        }
    }
    else {
        if (!decoder.isLHCoef ()) {
            if (!arithmetic_decoder_symbol (zeroCoefModel))
                decoder.setLSB (arithmetic_decoder_symbol (coefSignMode
1))) ;
        }
    }
}

```

FIG.16a

```

bitModel.startModel () ;
for (int i = 0 ; i < hBlockSize ; i++) {
    for (int j = hBlockSize ; j ; j--,p++) {
        coefHlafBit [i] [j] = arithmetic_decoder_symbol (bitModel) ;
    }
}

```

FIG.16b

09837862, 031302

Inventors: Dekel *et al.*

Title: "SYSTEM AND METHOD FOR THE LOSSLESS PROGRESSIVE
STREAMING OF IMAGES OVER A COMMUNICATION NETWORK"

Serial No.: 09/837,862

Docket No.: 18104.0011U1

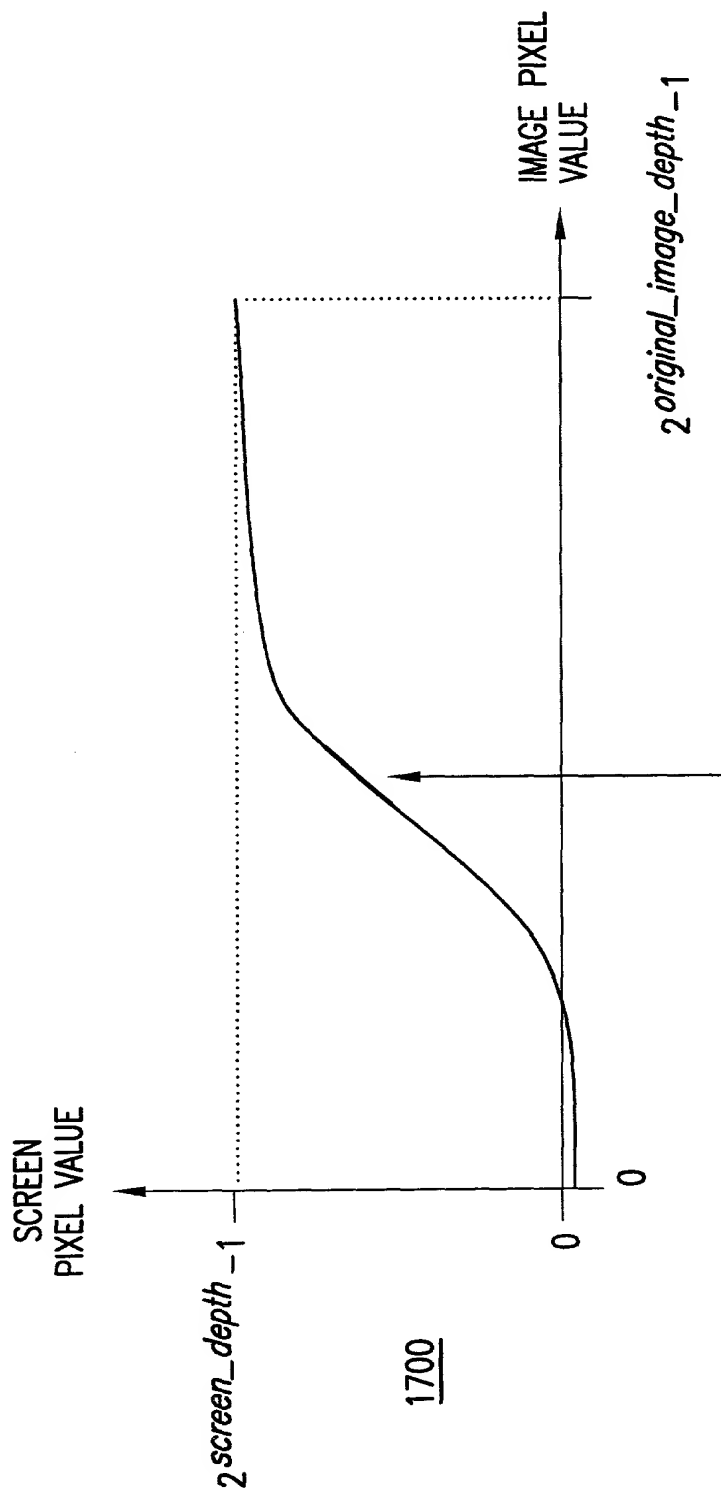
Filing Date: April 17, 2001

Contact: Lawrence D. Maxwell, Esq. (404) 688-0770

EXPRESS MAIL LABEL NO.: EL491883026US

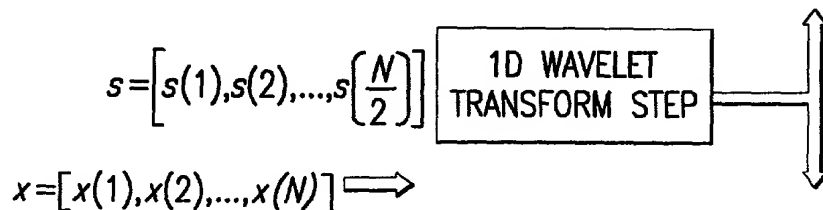
Sheet 17 of 26

17/26



18/26

1800



$$d = [d(1), d(2), \dots, d(\frac{N}{2})]$$

$$X = \begin{bmatrix} x(1,1) & x(1,2) & \dots & x(1,N) \\ x(2,1) & x(2,2) & \dots & x(2,N) \\ \vdots & \vdots & \ddots & \vdots \\ x(M,1) & x(M,2) & \dots & x(M,N) \end{bmatrix}$$



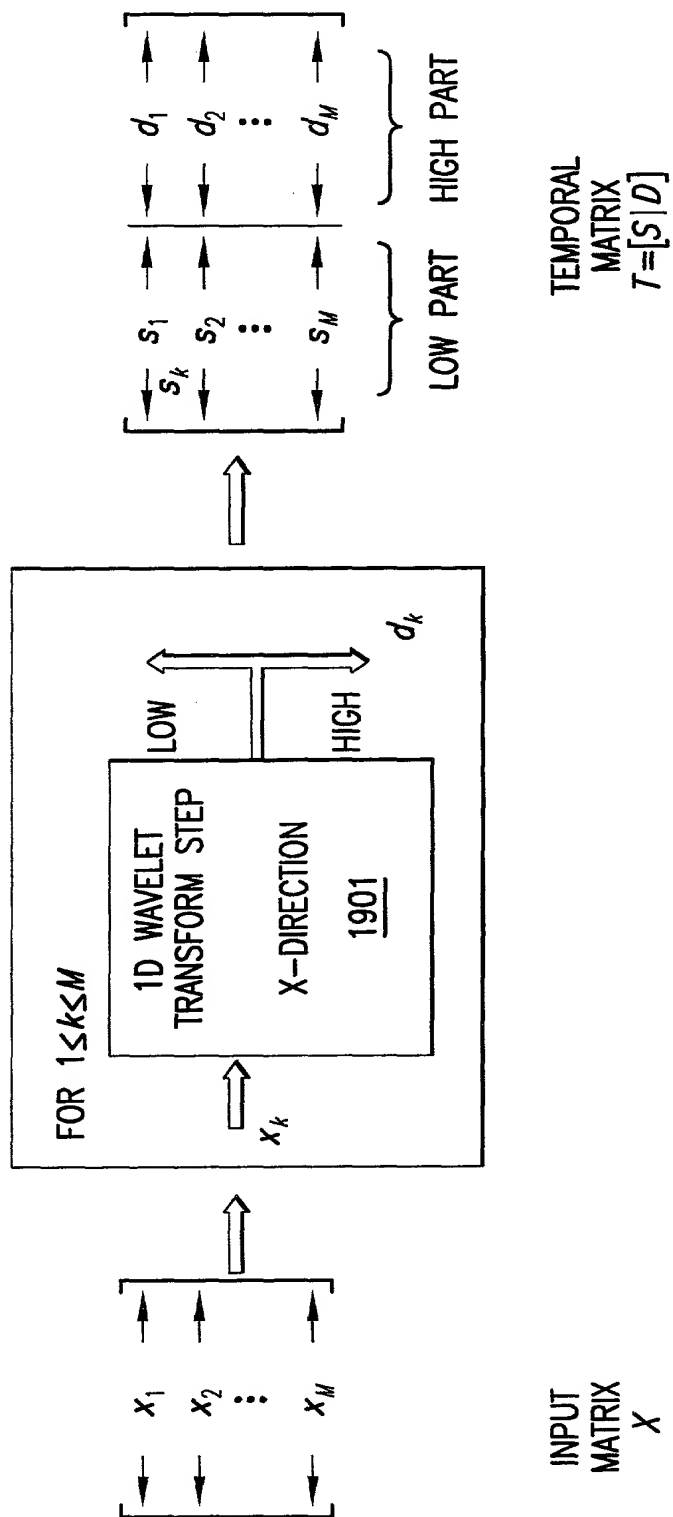
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2D WAVELET TRANSFORM STEP

$$\hat{X} = \begin{bmatrix} LL & HL \\ LH & HH \end{bmatrix} = \begin{bmatrix} ll(1,1) & \dots & ll(1,N/2) & hl(1,1) & \dots & hl(1,N/2) \\ \vdots & \ddots & \vdots & \vdots & \ddots & \vdots \\ ll(M/2,1) & \dots & ll(M/2,N/2) & hl(M/2,1) & \dots & hl(M/2,N/2) \\ lh(1,1) & \dots & lh(1,N/2) & hh(1,1) & \dots & hh(1,N/2) \\ \vdots & \ddots & \vdots & \vdots & \ddots & \vdots \\ lh(M/2,1) & \dots & lh(M/2,N/2) & hh(M/2,1) & \dots & hh(M/2,N/2) \end{bmatrix}$$

FIG.18

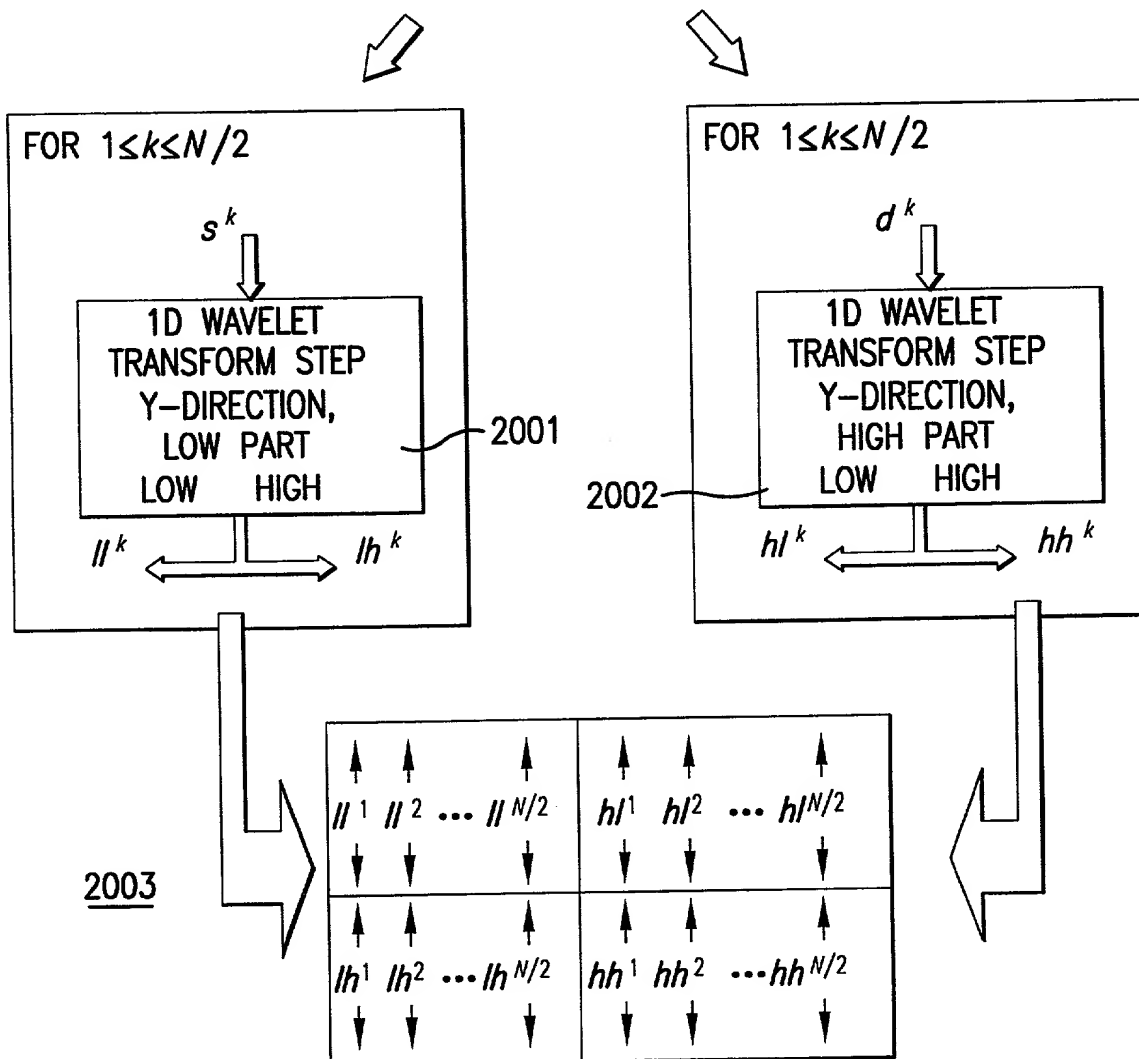
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FIG.19

$$\left[\begin{array}{c|c} \begin{matrix} \uparrow & \uparrow & \dots & \uparrow \\ s^1 & s^2 & \dots & s^{N/2} \\ \downarrow & \downarrow & \dots & \downarrow \end{matrix} & \begin{matrix} \uparrow & \uparrow & \dots & \uparrow \\ d^1 & d^2 & \dots & d^{N/2} \\ \downarrow & \downarrow & \dots & \downarrow \end{matrix} \end{array} \right] \quad 2000$$



OUTPUT MATRIX

$$\hat{X} = \left[\begin{array}{c|c} LL & HL \\ \hline LH & HH \end{array} \right] \quad 2004$$

FIG.20

LET I BE THE ORIGINAL IMAGE,



FOR $0 < i < \text{LEVELS}$

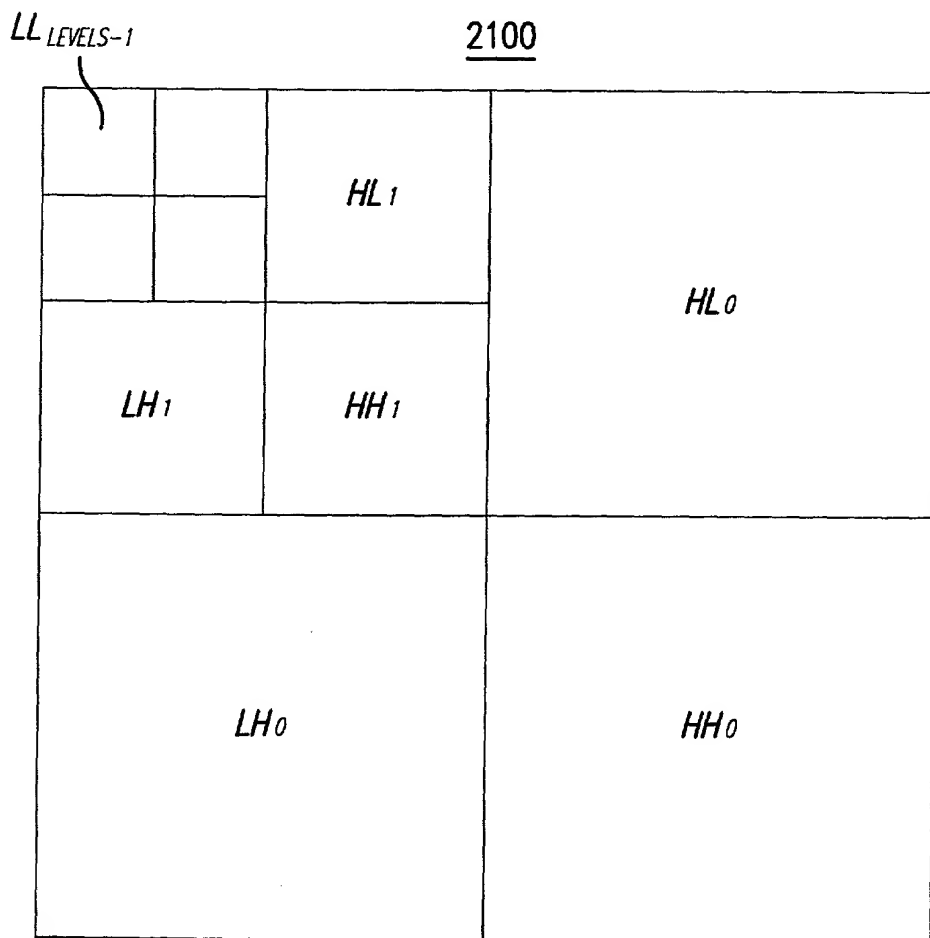


FIG.21

"DECEMBER 2001" 298/2860

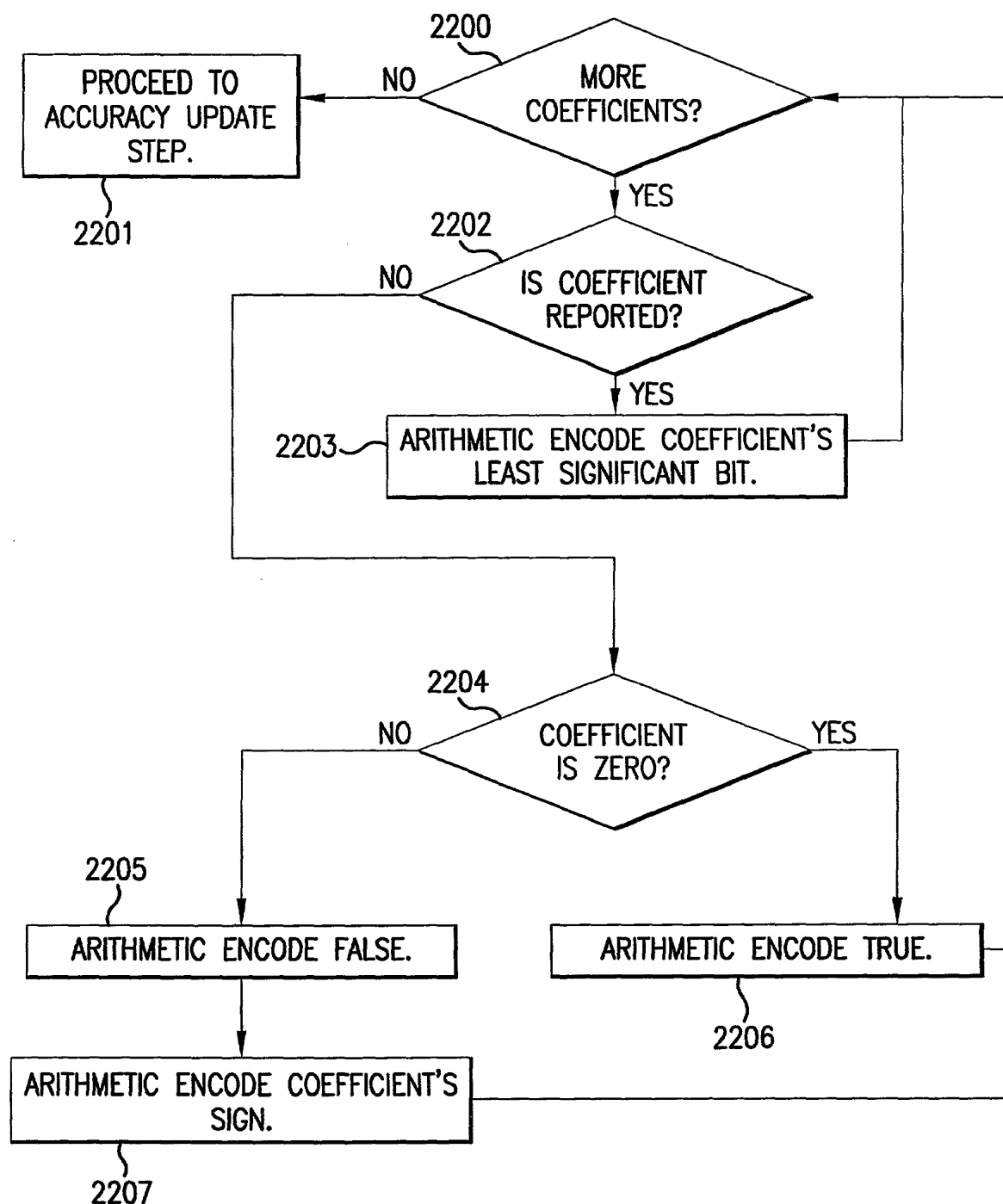


FIG.22

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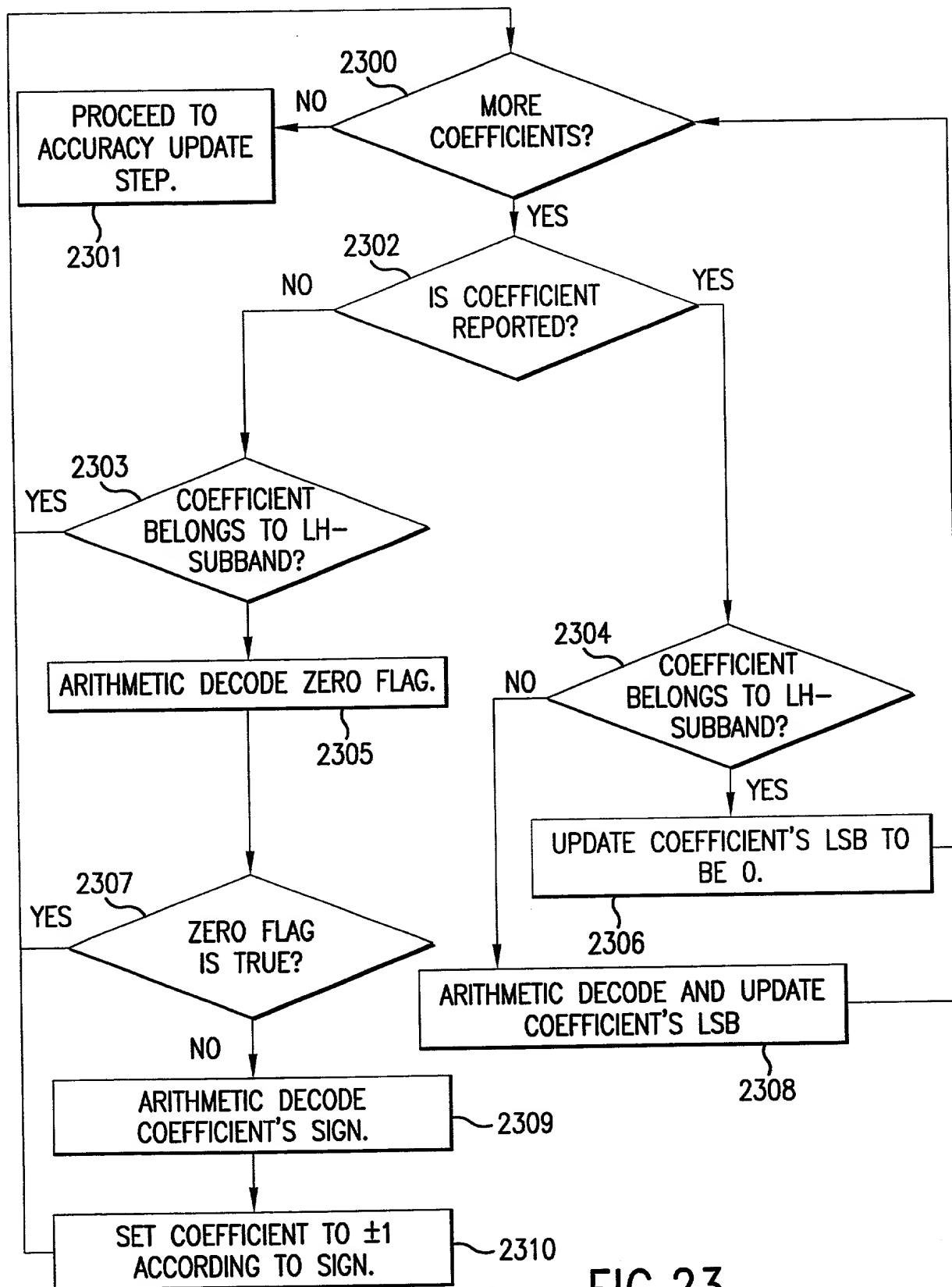


FIG.23

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24/26

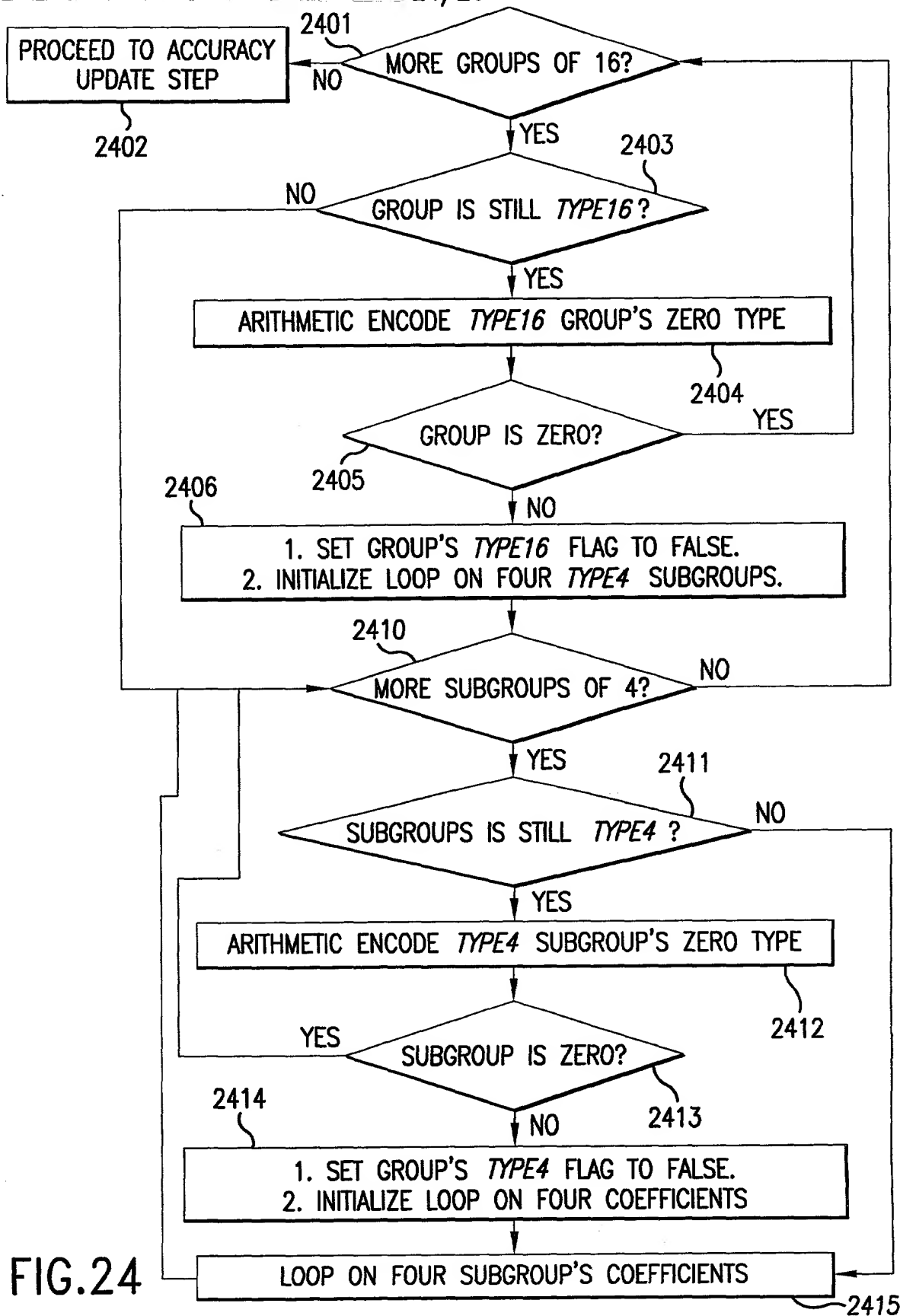


FIG.24

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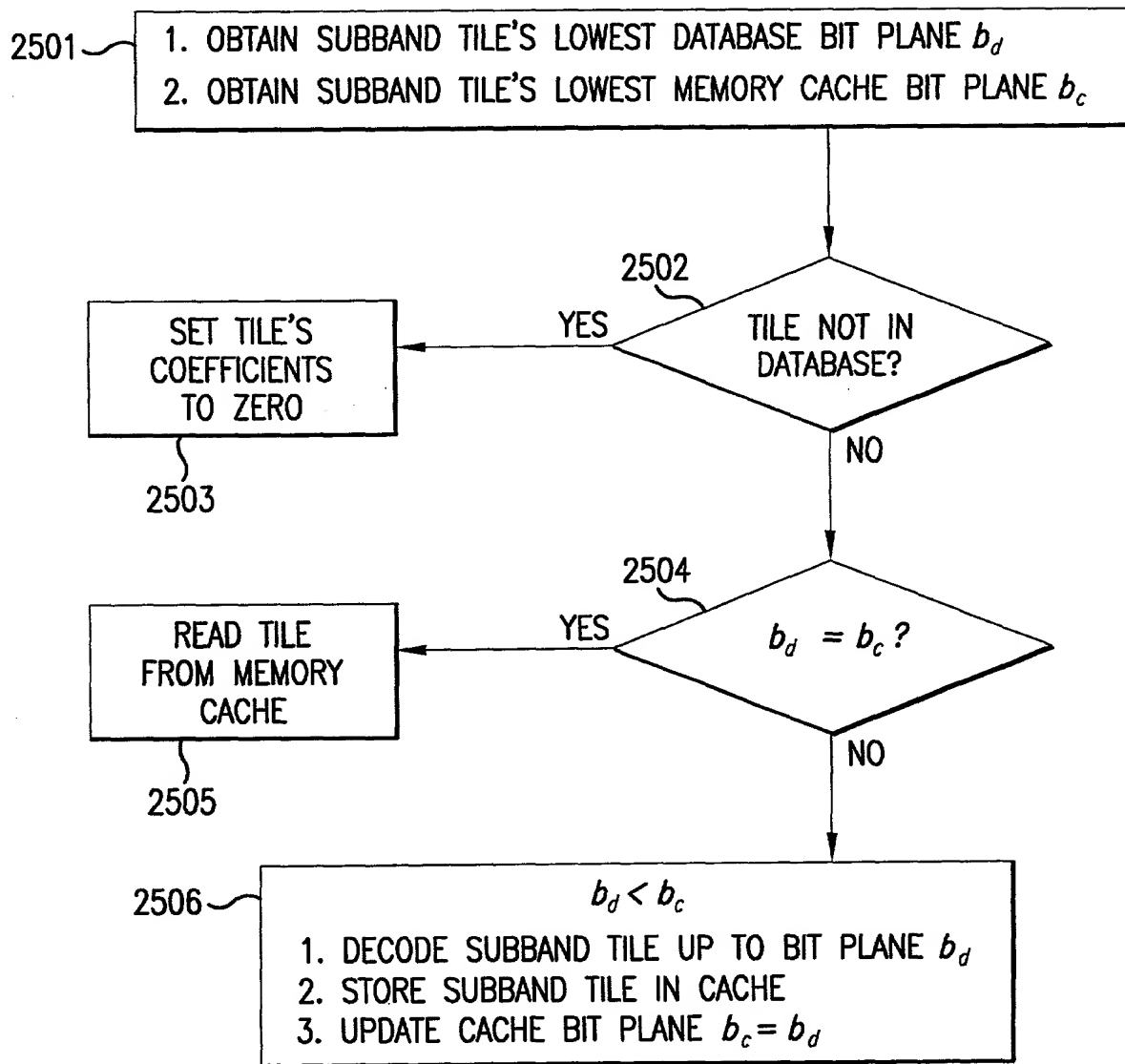


FIG.25

09/837,862-031002

PREPROCESSING MULTIREOLUTION STRUCTURE

